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CEREBELLAR ATROPHY IN LAMBS (DAFT LAMBS)

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INTRODUCTION

In 1945 White and Rowlands recorded the occurrence of a functional defect of young lambs in North Wales associated with locomotor disability. They detailed the history of the flock concerned, outlined the symptoms shown and stressed the superficial resemblance of the "ataxia" present to that seen in swayback (a demyelinating disease of lambs associated with a "conditioned" copper deficiency—see review by Innes, 1949). The defect was thought to have been introduced into the North Wales flock by a ram purchased in 1940 and was considered to be hereditary. This was followed by a publication from Innes, Rowlands and Parry (1949) which defined the condition more clearly and established the nature of the nervous lesions which were concluded to represent a form of cortical cerebellar atrophy of an inherited nature. This publication also reported on the examination of affected "daft" lambs from Scotland, Northumberland and Yorkshire, in all of which a similar pathological entity was found. The present article provides additional evidence on the widespread occurrence of the disorder, which is commonly known as "daft". lamb disease.

Daft lamb disease is a congenital abnormality and has been noted in a variety of flocks in the North of England. It is by no means confined to pure-bred sheep or to one breed or sex. On the contrary, a condition which is clearly daft lamb disease has been observed and studied in pure-bred Border Leicester lambs and in lambs from North Country ewes (Half-breds) and Greyface ewes crossed with Down rams. It has also been observed in Blackface lambs. The disorder is well known to many flock-masters and shepherds, but is generally of trifling incidence and the odd-occurring case calls for little comment other than the recollection of an imperfectly formed or "swingbacked" lamb. That occasionally the incidence may be high and the disease constitute a serious breeding risk is well authenticated by the above reports and by the accompanying flock histories.

The symptoms of the disease appear at birth or shortly afterwards, the affected lamb being unable to stand and suckle. Some are able to rise but maintain their balance with great difficulty, and as apparently they are unable to co-ordinate limb movements they soon fall over. Daft lambs are born at full term, appear of normal weight, well-nourished and superficially quite healthy. When one of twin lambs is affected it is frequently the bigger and stronger-looking. An almost invariable and typical symptom, which fixes the disease so clearly in the shepherd's mind, is that the head is carried high and to one side and is continually nodded in characteristic rapid involuntary shuttle-like movements. More rarely these clonic movements occur in or are confined to the tail region. Presumably these are milder cases because some of such affected lambs may be reared. Daft lambs are unable to suckle the ewe in the usual way, but why this is so is doubtful. The sucking and swallowing reflex is however intact, for affected lambs drink milk readily through a teat from a bottle, so natural suckling difficulties may partly be due to inco-ordination. On the other hand, daft lambs seem to be unaware of their surroundings and indeed the term "daft" or "silly" lambs is used by shepherds to denote a mental state bordering on idiocy. The condition of affected lambs tends to worsen and usually they are destroyed, although by careful attention it is possible to keep them alive for several weeks. Many affected lambs die from intercurrent infections. Information received from farmers during this enquiry suggests that, as with swayback, there may be degrees of daft lamb disease with an arrest but no resolution of the disease process in mild cases. This observation is also suggested by a consideration of the cerebellar disorder.

In his neuropathological studies of this disease Innes (1950)* found no inflammatory cell infiltrations, no foci of demyelination and no haemorrhages or vascular changes, and thus he was able to eliminate several etiological possibilities, such as swayback, infections due to bacteria, viruses, etc. The brains all showed specific lesions, restricted to the cerebellum, consisting essentially of swelling, vacuolation or complete disappearance of the Purkinje cells and to a lesser extent, the large Golgi cells in the granular layer. Innes *et al.* (1949) stated that the signs observed in daft lambs bore resemblance to those recorded by Rasmussen (1943) as an "hereditary defect" occurring in in-bred lines of Corriedale sheep in Canada. More recently, Innes and MacNaughton (1950) have identified cerebellar lesions in three typical cases from this Corriedale flock comparable in every way with those found in "daft lambs." Thus, despite many superficial—but not real—clinical resemblances to swayback, daft lamb disease is clearly a distinct and separate disorder of the ovine nervous system and has been recorded in both Britain and Canada.

PERSONAL INVESTIGATIONS

FLOCK 1. Early in 1947 an opportunity arose of making some enquiries into daft lamb disease as it occurred in a well-managed flock of about 140 pedigree sheep in the North of England. The history available was as follows:—Daft lambs were first noted in March, 1944. There were two cases both sired by one ram (ram X). A further nine cases occurred the following year, all sired by ram X. In 1946 there were 37 affected lambs—22 ram lambs and 15 females—or about 17 per cent. of the lamb crop, no fewer than 18 per cent. of the ewes dropping affected lambs. Some

* See Bogeart, L. van, & Innes, J. R. M. (1950.) *Archiv. Path.* (in press), for detailed analysis of the neuropathology and a comparison of cerebellar atrophies in other animals.

of the affected ram lambs were sired by ram X and the others were produced out of his shearling ewes by other flock rams. Of the affected ewe lambs the majority were said to be sired by other flock rams. Despite this fragmentary history it would appear that for two seasons daft lambs were confined to the progeny of ram X, and thereafter the disorder turned up not only among his own lambs but also in the progeny of his shearling ewes by other rams, and even in the progeny of ewes unrelated to ram X when mated to unrelated rams.

On the assumption that these 37 lambs were in fact all affected with daft lamb disease the scatter of cases throughout the flock appeared to be unlimited, and was wide enough to arouse some doubts as to the validity of the hereditary theory of causation unless the flock was very strictly in-bred or line-bred. This however did not appear to be so. The matter was discussed early in 1947 and two mutually exclusive theories were advanced.

Heredity.—The owners contended that the disease resulted from the use of a " tainted " ram (ram X), and that it was therefore hereditary and transmitted by means of a specific recessive daft lamb gene. There was undoubtedly a good deal of *faute de mieux* about this theory because the flock evidence was admittedly flimsy, and it was therefore decided to investigate the blood lines in question and await developments.

Malnutrition.—All concerned with this flock had noted some resemblance of daft lamb disease to swayback. The time of occurrence, the occasional appearance of blindness and its fatal outcome are all paralleled in swayback, and in 1947 when it was necessary to consider the problem broadly there seemed insufficient reasons for excluding an hypothesis based upon malnutrition. It was certainly important to try to establish whether daft lamb disease is a conditioned mineral deficiency of a nature homologous to swayback: and it appeared to be equally interesting to know that it is not.

In this connection the farm history is of interest. The disease was unknown in this flock until the owner acquired an unimproved and under-farmed holding, which none the less had a splendid reputation for sheep. This land was taken over in 1943 and reconditioned by heavy manuring for arable crops and grass. The result was a general step-up in productivity estimated at two to threefold, and the land carried many more livestock, but it was stated that the sheep now failed to maintain their previous high standard of thrift. The suggestion therefore was made that manuring for crops might not necessarily and in all respects suit livestock, and might possibly accentuate a borderline soil or herbage deficiency and thus contribute to under production or even to deficiency diseases. The ewes in question were always wintered on this farm until near lambing time. The amount of speculation involved in this conception was freely acknowledged in 1947 but it had the merit of suggesting an experimental approach to the problem which in no way prejudiced the issue. It was therefore decided to include a mineral feeding experiment as part of the general plan of investigation.

Mineral Feeding Experiment.—The flock ewes were drawn at random into two groups in January, 1947. Group A consisted of 40 ewes which were kept separate and given the customary winter ration of bruised oats, turnips and hay. No mineral supplement was allowed.

Group B consisted of 100 ewes and in addition to the above standard ration received ½ oz. daily of a commercial " grape-shot " mineral mixture in powder form. As its formula was not stated, the mixture was analysed by the Chemistry Department, King's College, and showed no evidence of the presence of copper, cobalt or iodine. Consequently the ewes were given tablets containing these trace elements with manganese in addition. Tablets were administered on January 25th and again on February 15th.

Feeding with supplementary minerals to Group B ewes commenced on January 22nd. Due to an oversight on the shepherd's part the Group A ewes received this supplement for one week, *i.e.*, until January 29th. Lambing was due to commence on February 28th.

Results:

Table I

Daft Lambs, 1947 (140 Ewes)

Lamb No.	Group and sex	Single or twin	When affected	Fate	Birth date
1	Male GP A	Single	At birth	Killed 6.3.47	26.2.47
2	Female GP A	Twin	At birth	Died 12.2.47	9.3.47
3	Female GP B	Twin	At birth	Killed 14.3.47	11.3.47
4	Female GP A	Twin	At birth	Killed 13.3.47	12.3.47
5	Female GP A	Single	At birth	Killed 15.3.47	14.3.47
6	Female GP B	Twin	At birth	Despatched to Dr. Innes alive, 20.3.47	17.3.47
7	Female GP B	Single	At birth	Lived four weeks	17.3.47
8	Male GP B	Single	At birth	Killed 20.3.47	19.3.47
9*	Female GP B	Twin	At birth	Died 25.3.47	24.3.47
10	Female GP B	Twin	At birth	Died 28.3.47	19.3.47
11	Female GP B	Twin	At birth	Died 2.4.47	29.3.47
12	Female GP B	Twin	At birth	Died 9.4.47	6.4.47

* Lamb 9. The brain from this lamb was examined by Dr. Innes, who reported the presence of widespread angiomatous malformation of the nervous system, together with some cerebellar atrophy. This was a freak lamb (scoliosis and absence of tail). It showed head symptoms of daft lamb disease.

Table I shows that 140 ewes produced eleven lambs (or 12 if the freak lamb is included) affected in varying degrees with daft lamb disease. Four of these lambs were from Group A ewes (no minerals) and seven from Group B ewes (minerals). It was therefore apparent that the five weeks of supplementary feeding with minerals had proved insufficient to control the disease, but it will be noted that the over-all incidence of daft lambs in 1947 was much lower than in 1946 (6·0 per cent. as against 17·0 per cent.).

These lambs all showed the defect at birth. All were born full term except No. 1 which was slightly premature. There were nine affected females and two affected males. The Table shows that where twins were born only one lamb was affected, and when this happened it was always the stronger-looking lamb which went down.

Lambs 8, 9, 10 and 11 were unable to rise and showed the head symptoms. Lamb 10 was most severely affected and was blind in the right eye, while the right ear was devoid of sensation and lay flaccid over the orbit.

Post-mortem examinations were carried out on lambs 1, 2, 3, 9, 10 and 11. The internal organs showed no abnormalities. In lamb 6, examined histologically by Dr. Innes, cerebellar lesions typical of daft lamb disease were found. Bacteriological cultures were made from the organs of four of the lambs with negative results. Nineteen blood samples were taken, ten from Group B ewes which produced normal lambs, and nine from ewes which produced daft lambs, five of which had received supplementary minerals. These results are given in Table II.

TABLE II

BLOOD CHEMICAL DATA ON SAMPLES FROM 10 GROUP B EWES WHICH PRODUCED HEALTHY LAMBS

mg. % serum			mg. % blood	gm.% blood
Calcium	Magnesium	Acetone	Copper	Haemoglobin
10·2	2·6	Normal	0·09	13·7
10·4	2·5	"	0·09	14·5
10·4	2·5	"	0·08	14·2
10·6	2·8	"	0·09	—
10·3	2·4	"	Clotted	—
10·4	2·7	"	0·10	11·5
9·0	2·8	"	0·09	11·6
9·7	2·2	"	0·09	12·6
10·8	2·9	"	0·10	—
11·0	2·1	"	0·10	12·8

FROM EWES WHICH PRODUCED DAFT LAMBS

Group	mg. % blood	mg. % serum			gm.% blood
	Copper	Calcium	Magnesium	Acetone	Haemoglobin
1 B	0·10	9·7	3·3	Normal	11·8
2 B	0·11	9·6	2·3	"	10·2
3 B	0·08	8·7	2·5	"	11·0
4 B	0·12	9·8	2·9	"	—
5 B	0·11	10·1	2·5	"	10·2
6 A	—	11·0	3·6	"	—
7 A	0·10	8·7	3·2	"	10·9
8 A	0·10	10·3	2·9	"	12·9
9 A	0·11	9·4	2·9	"	13·6

All these values fall within the normal ranges except the calcium values of ewes 3 and 7 which are somewhat low.

FLOCK 2. Daft lamb disease is not confined to certain pure breeds, and in 1947 cases were observed among the progeny of a small flock of mixed breeding. The flock consisted of 78 Greyface ewes, Cross Suffolk ewes out of Greyface ewes and about 12 pure Suffolk ewes, all mated with Suffolk rams, three rams being used. There were nine defective lambs all of which showed symptoms indistinguishable from the typical disease. Some were affected at birth, but others developed the disease three to 24 hours afterwards. It was not possible to separate exactly the progeny of each ram, but the shepherds stated that daft lambs came from all three sections of the flock. This farm had a history of swayback successfully controlled by copper supplementation, but during the severe weather in 1947 this supplement was omitted, and in addition the flock suffered other privations. Two cases of pregnancy disease occurred. Since 1947 mineral supplementation was resumed, and there have been no further cases of daft lambs.

Post-mortem examination was carried out on three lambs from this flock ; the brain showed the typical lesion of cellular degeneration in the cerebellar cortex. This was confirmed by Dr. Innes.

Since 1947 clinical daft lamb disease has been noted on four other farms affecting the progeny of Cheviot, Blackface and Swaledale ewes. Unfortunately it was not possible to obtain suitable specimens from all these outbreaks, and due to lack of histological examinations exact diagnosis would be uncertain. Affected lambs on these farms showed the clonic head movements, they were all defective incoordinate lambs and were probably true daft lambs.

TABLE III

PEDIGREE OF AFFECTED LAMBS (1947)

Lamb No.	Sire	Dam
1	Kilmux Flashlight	A ewe by Eshott Perfection
2	Toppanthank Elegance	" Eshott Perfection
3	Kilmux Flashlight	" Greenlawdean Splendour
4	Kilmux Flashlight	" Greenlawdean Splendour
5	Toppanthank Elegance	" Kilmux Flashlight
6	Kilmux Flashlight	" Toppanthank Elegance
7	Kilmux Flashlight	" Toppanthank Elegance
8	Toppanthank Elegance	" Kilmux Flashlight
*9	Ping	" Tillymaude Superb
10	Kilmux Flashlight	" Deuchers Ambassador
11	Kilmux Flashlight	" Knockdon
12	Toppanthank Elegance	" Kilmux Flashlight

* This was a freak lamb.

From this record the following points emerge:—

1. Kilmux Flashlight sired seven daft lambs four of which were out of ewes themselves sired by rams which had previously produced daft lambs (lambs 3, 4, 6 and 7).

2. Toppanthank Elegance sired four daft lambs three of which were out of ewes themselves sired by rams which had previously produced daft lambs (lambs 5, 8 and 12).

3. On the male side Eshott Perfection and Greenlawdean Splendour are line bred from Muirside Footprint (G. Grandsire) but are unrelated (at any rate closely) on the female side. Muirside blood is found on the female side of Toppanthank Elegance, but is absent from the pedigree of Kilmux. Ping, which replaced Greenlawdean Splendour, has also Muirside blood (G. G. G. Grandsire), and this ram was not known to have sired a single typical daft lamb. It will be seen that four of these daft lambs were out of ewes sired by rams which were not known to have sired any daft lambs. In other words, relative to their breeding the distribution of daft lambs in 1947 was widely scattered and apparently of random incidence.

Histological Examination.—In addition to sending living and dead specimens to Dr. Innes, material from the central nervous system of other affected lambs was examined histologically in Newcastle. Sections from the cerebrum, cerebellum, medulla and cord were examined by Marchi's method and no myelin degenerations were found. Other sections were stained by haematoxylin and eosin and by other stains and the changes described by Innes *et al.* likewise were found, *viz.*, degenerative changes in Purkinje cells varying from shrinkage to swelling, vacuolation to complete disappearance. Similar lesions were found in the nervous system from lambs of both flocks which excluded the existence of swayback and confirmed their pathological identity.

It is probable that the lesions present in the cerebellum of daft lambs account for the observed inco-ordination of movement and disturbance in equilibration.

DISCUSSION ON ETIOLOGY

White and Rowlands (1945) and Innes *et al.* (1949) considered that daft lamb disease was an inherited disorder and based this opinion on the sequence of events in the North Wales College flock, from which fairly complete records were available. This evidence may be summarised as follows: The College flock consists of about 60 pedigree Welsh ewes and rams maintained in order to provide

good rams for the much larger mountain flock under the same management. Daft lambs were first noted in 1944, and as they were confined to one ram's progeny the hereditary nature of the disease was suspected. Later, the disease was attributed to the introduction of one ram (ram 1) to the pedigree flock in 1940. This ram was retained and used for three seasons, and in 1942 and 1943 many of the pedigree ewes were his own daugnters. Two rams were used in 1943—ram 2 (distantly related to ram 1) and ram 3 (a son of ram 1). The results of this mating were as follows:—

Ram 2 × 13 ewes (nine daughters of ram 1)—no defective lambs.

Ram 3 × 32 ewes (23 daughters of ram 1 and half-sisters of ram 3)—nine produced defective lambs. There were no daft lambs from the nine unrelated ewes.

Rams sired by ram 1 were used on the mountain flock in 1942, 1943, 1944 and 1945. This clearly would mean a certain number of ewes closely bred in this flock and four daft lambs occurred but not until 1945. Finally in that year ram 3 was bred to 12 of his daugnters and three of them dropped defective lambs the following spring.

An inspection of the pedigrees of Flock 1 rams which sired defective lambs shows that on the male side at any rate they are not closely related ; although Muirside blood is present in four out of five pedigrees. The stock rams in Flock 1 are purchased as out-crosses, and if used for more than two seasons care is taken to avoid sire and daughter matings. Thus Kilmux was mated to Greenlawdean ewes, and Toppanthank was mated to Kilmux ewes. With the exception of Ping, which was a shearling purchased to replace Greenlawdean, the same rams were used in 1945 and 1946, and the significant difference in the incidence of daft lambs in the following lambing seasons already has been noted. It cannot be said, therefore, that Flock 1 provides any positive evidence in support of an hereditary theory of causation, unless it be assumed that the whole breed is thoroughly tainted with daft lamb disease, an assumption which is scarcely justified by the facts. Moreover, the history of Flock 2 shows that the taint is not confined to one pure breed, and that, on the contrary, the disease occurs in lambs of quite mixed genotype. It is believed that daft lambs here were sired by all three Suffolk rams when mated to pure-bred and cross-bred ewes. Are all these breeds and cross-breeds tainted ? What is known about the widely spread but generally trifling incidence of the disease makes this seem unlikely. In Flock 2 many of the same ewes and all the same rams were again used the following year, and no daft lambs were noted.

In their original article on daft lambs White and Rowlands (1945) state " it so happened that two different rams had been used in this flock, so that—as will be seen—it was possible to establish the probability that the condition is hereditary." This statement implies some degree of doubt, and indeed on re-reading this flock history it is difficult to see how this qualification could have been omitted. For example, ram 1 was used in 1940, 1941 and 1942. Consequently his shearling ewes came into the pedigree flock in 1942, thus permitting some sire-daughter matings (Rowlands priv. com., 1949). If the defect in the lambs arises from an inherited taint (recessive gene) one might have expected some daft lambs from this mating, but none was recorded, the trouble first being observed in 1944. Since the symptoms of daft lamb disease are sufficiently striking they are unlikely to be missed by an observant shepherd.

White and Rowlands explained that many of ram 1's male progeny were used on the mountain flock from 1942 onwards, and as these ewes are not bred until they are 18 months old sire-daughter matings could not occur until the autumn of 1944. The following spring there were four defective lambs presumably from this mating. It was therefore considered that ram 1 transmitted a defective recessive daft lamb gene to his male and female progeny, and that subsequent inter-breeding of these related animals might produce daft lambs, which presumably could not turn up unless this particular conjugation occurred. In the North of England Flocks 1 and 2, however, the disease occurred when these particular conditions were not met, because in Flock 1 in-breeding is sedulously avoided, and in Flock 2 which produces fat lambs it is impossible. This fact, taken in conjunction with an incidence of only four daft lambs in the North Wales flock in 1945 where this in-breeding took place, suggests that the apparent " immunity " of the other lambs identically bred may have been due to an entirely different cause.

The mineral feeding experiment carried out on Flock 1 ewes gave an inconclusive result. This in part may have been due to too late a start, the use of the wrong mixture and to the stormy weather which undoubtedly interfered with the exact conduct of the trial. The Flock 2 ewes also suffered certain nutritional privations during the winter of 1947. The subsequent history of Flock 1 is interesting. In 1947 many of the same ewes were mated to the same rams and only two defective lambs were born: no cases occurred in 1949. During these years the only notable change in management was that mineral supplementation of the pregnant ewes was more thoroughly conducted. In Flock 2 the incidence of daft lambs was nil in 1948 and 1949, although in 1948 the same ewes were mated to the same rams. This fact alone would seem to provide an important objection to the hereditary theory of causation.

In their discussion of daft lamb disease in North Wales Innes *et al.* (1949) state " there was no known deficiency of minerals or trace elements in this area " (College Farm). This may indeed be true for the area concerned, but the remark would be regarded as incautious if applied to any area or farm in the North of England. Experiments conducted by the Duke's Fund in Northern flocks (Lyle Stewart, 1944) showed that trace element deficiencies, as judged by the response of lambs to the oral administration of trace elements, was common in areas where this had not previously been suspected. Actually lambs from Flock 1 were included in the above mentioned series of experiments, and, rather surprisingly, had shown a significant liveweight increase attributable to trace element administration. Bearing in mind the analogies with swayback in lambs, the trend of evidence from this investigation of daft lamb disease in the North of England justifies the tentative rejection of the theory that this cerebellar atrophy in lambs is inherited and substitutes one of malnutrition. No attempt has been made to discover whether or not this suspected deficiency is general or specific in nature, conditioned or direct.

Researches into the nature of certain disorders of poultry have focused attention upon specific dietary deficiencies, and recently Bird (1949) has described a magnesium deficiency disease in young chicks, characterised by poor growth, ataxia and inco-ordination of movement. Bird correlates these symptoms with the observed neuropathological alterations in the Purkinje cells of the cerebellum, and these bear some resemblances to the lesions in daft lamb disease. An increase in the size of these cells together with the nuclear changes are ascribed to magnesium

deficiency, and the addition of a small amount of magnesium to the deficient diet gave complete protection. This author adds that Barron *et al.* (1947) has reported similar pathologic changes in the cerebellum of magnesium deficient rats.

While one must avoid the temptation to draw emphatic homologies with experimental work on other species, and more especially as the cells of Purkinje are exceedingly fragile structures (Van Bogeart and Innes, 1950. See footnote) the above reports are interesting and suggestive.

Summary

An account of daft lamb disease as observed in the North of England is given with particular reference to the history of the flocks concerned. The specific lesions affecting the cerebellar cortex of "daft" lambs as described by Innes *et al.* were found. Alternative views on the etiology of this defect are examined and discussed and the suggestion is made that it may be essentially a manifestation of mineral malnutrition and preventable by suitable supplementation of the pregnant ewes diet.

Acknowledgments.—I am indebted to Dr. J. R. M. Innes and desire to thank him for examining an affected lamb and other specimens and for guidance with histological techniques. Also to the Biochemical Laboratory at Weybridge for biochemical estimations and in particular to Mr. D. Moore, B.SC., who carried out many of the field observations.

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NOMENCLATURE OF PEST CONTROL PRODUCTS

A Technical Committee for Nomenclature of Pest Control Products has been appointed by the British Standards Institution and includes representatives of Commonwealth countries, Government departments, scientific societies and manufacturers' organisations. The Committee's terms of reference are: "To prepare standards for the nomenclature for insecticidal and fungicidal chemicals and other pest control products." It is working in the closest collaboration with the Standards organisations in Commonwealth countries, and with the Inter-Departmental Committee on Pest Control in the United States of America. Standards organisations in other countries have been informed of the formation of the Committee and of its proposed programme, and it is hoped that it may eventually be possible to arrive at international agreement on nomenclature.

Confusion has arisen in commercial descriptions of products and in the scientific literature. The problem was discussed at the Commonwealth Entomological Conference in 1948, and a resolution passed urging the appointment of a committee to agree common names for established compounds. The Executive Council of the Commonwealth Agriculture Bureaux referred the recommendation to the British Standards Institution, as the appropriate body in the United Kingdom to deal with the matter.

CLINICAL COMMUNICATION

A CASE OF BILATERAL TESTICULAR HYPOPLASIA IN THE GOAT

D. H. L. ROLLINSON

Incomplete development of the testicle in the bull has been described by Lagerlof (1934, 1938) and Erikson (1938) and has been shown by Haq (1949) to exist in Great Britain. Hypoplasia of the testicle was recorded as causing sterility in 11 per cent. of male goats examined by Richter (1936) in Germany. As, however, there is little information in the English language on the semen picture of either normal or abnormal goats (see Anderson, 1945, and Asdell, 1946), the following case is deemed worthy of record.

Subject.—The animal was a British Saanen male, aged one year, and was said to be of excellent pedigree, although much inbred.

History.—The animal arrived on the farm at the age of two and a half months and was fed on a diet consisting of Lucerne hay, *ad lib.*, a moderate quantity of kale and up to 3 lb. a day of a mixture of crushed oats, flaked maize and diced mangolds, and was first used for service at the age of eight and a half months and was first used for service at the age of eight and a half months (September 21st). During that fortnight four females were served but none conceived. The male was rested from November 6th to December 18th, and then eight more females were served; none of these conceived and eventually all females put to this male conceived to another.

Examination.—Semen was collected by means of a ram-sized artificial vagina (temperature 42·5° C.), a young female in full heat being employed as teaser. The male was very keen, his erection normal and thrust good. Three ejaculates were taken, and for comparison of the semen picture in a fertile male one sample was collected from another British Saanen, one year old, which proved fertile on all the females served.

Table I

	Ejaculate	Volume	*p*H.	Appearance	Motility	Density	Abnormal sperm
Sterile	1	0·5 ml.	7·5	Watery	Absent	Too	—
	2	0·6 „	7·8	„	„	low to	—
	3	0·5 „	7·5	„	„	count	—
Fertile	1	0·5 ml.	6·8	Creamy	90 × 5	4,200,000	14%

Tissue cells in the sterile ejaculates were absent while in the fertile were of the following occurrence:—

Nucleated Squamous Cells ...	100 per cu. m.m.
Spermatids	200 per cu. m.m.
Multi nucleated Spermatids ...	200 per cu. m.m.
Boat-shaped cells	1,000 per cu. m.m.

Post-mortem *Examination*

On examination of the organs from the sterile goat the following dimensions were obtained (Table II). These have been compared to organs removed from a normal male of similar breed, aged seven months, but not that from which the semen analysis is presented.

TABLE II

	Sterile goat		Normal goat	
	Left	Right	Left	Right
Size (cm.)	6·0 × 4·5	5·5 × 4·5	6·5 × 3·7	6·5 × 4·0
Testicles				
Weight (grammes)				
Testicles + epididymis	91·0	83·5	116·5*	121·5
Testicles alone	Not weighed separately		98·0	101·0
Weight of epididymis			18·5	20·5

* Richter (1936) quotes 110 grammes as normal.

On histological examination the testicles showed a marked under-development of the tubules (Figs. 1 and 2). In many tubules only one layer of cells was present and vacuolation of this layer was marked. In a proportion of tubules spermatogenesis was proceeding to a limited extent, thus stimulating entirely the condition found in the bull.

Microscopically, the epididymis showed marked under-development (Figs. 3 and 4). The lumen of the epididymal canal was narrower than normal in all sections with sub-normal depth of the epithelial sheet. Inter-tubular hypoplasia was also present. The figures are given below.

TABLE III

Testicles	Normal goat		Sterile goat	
	Left	Right	Left	Right
Diameter of tubules ...	184·6–253·0μ	197·5–233·6μ	168·8–217·0μ	177·1–214·9μ
Epididymis				
(*a*) *Head*				
Diameter ...	344·2–427·0μ	329·8–383·0μ	115·2–147·8μ	159·8–216·7μ
Height of epithelium	76·4–92·20μ	57·4–68·6μ	22·5–27·5μ	25·9–26·6μ
(*b*) *Tail*				
Diameter ...	437·6–510·8μ	473·7–588·7μ	234·7–288·0μ	253·4–292·3μ
Height of epithelium	40·3–43·2μ	29·5–33·1μ	30·4–38·2μ	33·9–37·5μ

DISCUSSION

The picture presented by the case described above is strikingly similar in end result to the picture of hypoplasia (arrested development) in the bull. The vacuolar degeneration of the seminiferous tubules and under development of the epididymis are consistent with hypoplasia since some degree of degeneration and under development of the epididymis are present in this condition in the bull (Haq, 1949). Thus hypoplasia appears to be a better term than atrophy as used by Richter (1936). Whether any regression of the seminiferous tubules occurs in such cases is not clear, but sterility is uniform from the outset. Slight changes may be associated with the breeding season.

Pseudohermaphroditism is common in the domestic goat while hermaphroditism, while rare, is commoner than in other domestic animals (Asdell, 1946). Pseudohermaphrodites appear from the sex ratio to be genetic females in spite of the possession of testicles or ovotestis (Paget, 1943, Eaton, 1943, Asdell, 1944). Cryptorchidy is also common in the goat (Warwick, 1930). Hypoplasia may therefore be another related aberration in the sexual development of the goat.

SUMMARY

A case of testicular hypoplasia in the goat is described. Details are given of semen character, size, weight and structure of the testicles and these are compared with semen characters in a fertile animal, and the size, weight and structure of the testicles from a normal male aged seven months.

Acknowledgments.—The writer is indebted to Mr. N. R. Turnbull, of Basingstoke, with whom the case was seen, to Dr. N. S. Barron for his continued interest and Mr. H. Normal for the microphotographs, to Mr. F. A. Keep and Miss E. J. Shoesmith, for technical assistance.

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ABSTRACTS

[Contribution to the Study of Actinomycosis in the Dog. (Trans. title.) GORET, P. & JOUBERT, L. *Rev. Méd. Vét.* (1949.) **100.** 561–568.]

There is recorded here a case of septicaemic actinomycosis in the dog, apparently caused by a non-acid-fast, aerobic member of the genus streptomyces. The species is believed to be new, since in various ways, particularly in its lack of proteolytic power, it does not correspond with any of the named species of the genus. The organism, too, displays the phenomenon of dissociation which has not yet been observed in the family Actinomycetaceae.

The affected dog, a three-month-old spaniel, was emaciated, listless, dyspnoeic and had a racing heart. It showed signs of pain over the kidneys. After a few days' illness the animal died. The *post-mortem* findings were such as to give rise to a tentative diagnosis of miliary tuberculosis.

The lung substance was lightly congested, and the tracheobronchial lymph-glands were enlarged, fluctuating and full of viscid, yellowish pus. The pleura and pericardium were normal, but the heart muscle contained miliary nodules. Nodules were found also in the liver, spleen and in large numbers in the kidneys. Histologically, the kidneys showed an acute interstitial inflammation, suppurative in type, affecting mainly the cortex. Pus was found in the lateral ventricles and in the cerebrum, but not in the spinal cord. Organisms were numerous in all these tissues and in the bone marrow.

The infection was transmitted experimentally to guinea-pigs by intraperitoneal inoculation and to rabbits by intravenous inoculation, but it was not found possible to infect dogs by either route of inoculation. I. W. J.

Fig. 1.
Head Epididymis—Normal Goat. × 70.

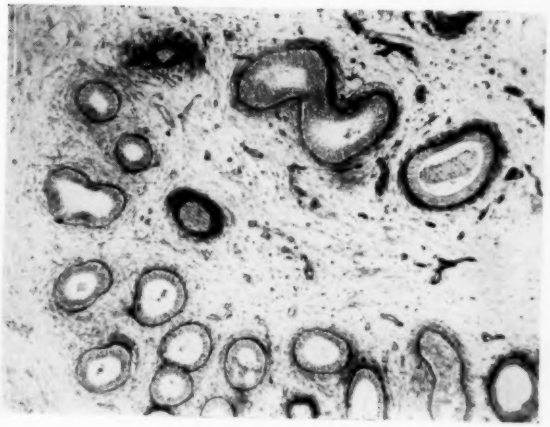

Fig. 2.
Hypoplasia—Head Epididymis. × 70.

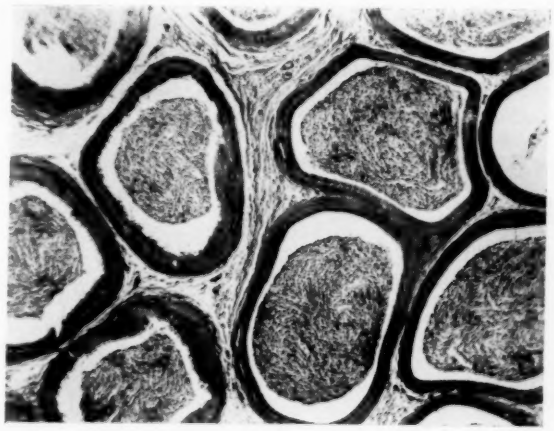

Fig. 3.
Tail Epididymis—Normal Goat. × 70.

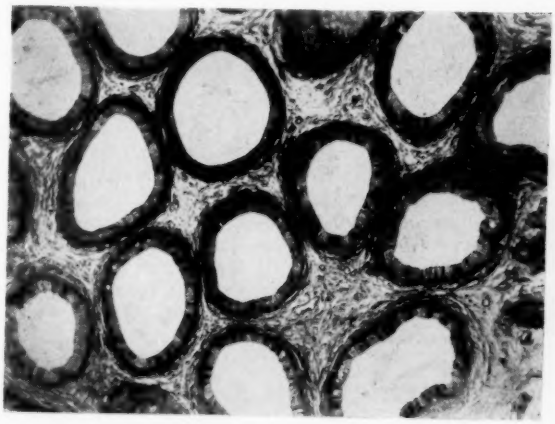

Fig. 4.
Hypoplasia—Tail Epididymis. × 70.

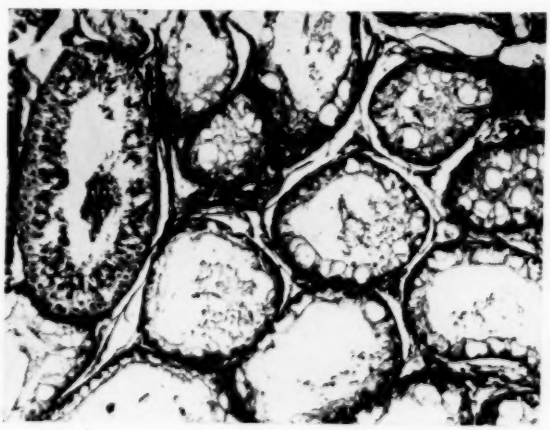

Fig. 5.
Hypoplasia Testicle. × 120.

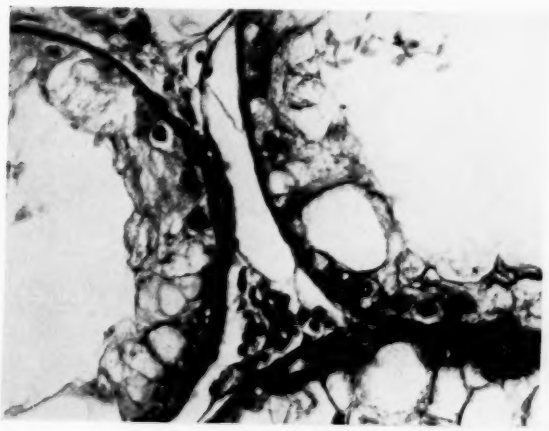

Fig. 6.
Hypoplasia Testicle. × 500

[The Australian Meat Export Industry and Long-distance Transport of Chilled Beef. Heywood, R. H., B.V.Sc., Acting London Representative and Executive Officer, Australian Meat Board, and Acting Commonwealth Veterinary Officer to the High Commissioner for Australia. (Benjamin Ward Richardson Lecture, delivered at the Royal Sanitary Institute, November 9th, 1949.) *J. Roy. San. Inst.* **10.** 145–153.]

Among the pioneers in the Australian meat export industry were William Denry Dangar, who set up a canning factory at Newcastle, N.S.W., in 1847, Thomas Sutcliffe Mort who carried out experiments in meat freezing in 1861 near Sidney, after abandoning the idea of chilling, and James Harrison who, in the meantime, in Victoria, was experimenting with the production of ice-making machines. After many heart-breaking failures, the Glasgow vessel "Strathleven," fitted with a Bell-Coleman refrigerating machine, left Sidney on November 29th, 1879, with 40 tons of beef and mutton on board. This cargo arrived at the Port of London in good condition 64 days later.

Australia's sheep population approximates 100,000,000, but wool production has made it necessary to breed a well-fleeced animal. The Southdown and other British breeds are now being developed in addition to the Merino, so that mutton quality has improved. The shorter distance between the River Plate and the London market gave the Argentine chilled beef trade a great advantage over Australia, but under the Linley system Australian beef was first sterilised and successfully shipped to England in 1807. This process is no longer used, being prohibited in Britain, as formaldehyde was one of the ingredients used in the sterilising process. Numerous experiments carried out since then, and the development of sanitary science and hygiene, have enabled great progress to be made, since the days when the first consignment of chilled beef from Australia to this country had to be frozen down on board ship before arriving in England. In 1932 successful shipments of Australian chilled beef were made to this country without the use of chemicals, attention being paid to hygiene and storage. Mould growth has been the great bugbear to the chilled beef trade, but as a result of research work done in Brisbane and at the Low Temperature Research Station, Cambridge, it was found that a concentration of 10 per cent. of CO_2 gas in the atmosphere of the chiller inhibited the growth of mould. This work made the Australian chilled beef trade with Britain a reality. Hygiene must start at the abattoirs, in the lairages with their cold-water sprays, cattle foot-baths and needle-spray baths. All cattle must pass through these before arriving at the "knocking-pen."

D. J. A.

LITTER TESTING IN SCOTLAND

For protecting and promoting the interests of pig breeders and feeders, the North of Scotland Pig Producers Association, Ltd., has been established with headquarters in Aberdeen, states *The Farmers' Weekly*. The first Chairman of the Association is Mr. F. D. Lawson, Dyce Bacon Factory, and the Vice-Chairman, Mr. T. C. Innes, Dienscroft, Huntly. The Directors represent the counties of Angus, Kincardine, Aberdeen, Banff, Moray, Inverness, and Ross and Cromarty.

The Association is to work in close co-operation with research institutes, the College of Agriculture, and the bacon factory. One of its objects will be a system of litter testing and recording. It is also hoped to institute a system of service by boars belonging to, or specially approved by, the Association on terms which would be of advantage to the members.

REVIEW

[Practical Veterinary Pharmacology, Materia Medica and Therapeutics. By Howard Jay Milks, D.V.M. Sixth edition. Pp. XIV + 720. Published by Baillière, Tindall & Cox, 7 and 8, Henrietta Street, London, W.C.2, price 76s. 6d.]

The previous edition of this work was fully reviewed in our issue of April 8th, 1944. The ever-increasing tempo in the field of chemotherapeutics and antibiotics has rendered the publication of a sixth edition essential.

The whole work has been carefully revised in the light of modern knowledge but the main changes are in the chapters dealing with the sulpha drugs, antibiotics and the vitamins.

The chapter on sulphonamides has been considerably expanded, absorption, elimination, blood concentration and several other important aspects of these chemotherapeutic agents being discussed in great detail. All the sulpha drugs of any practical value are described and an extremely useful (and interesting) table is included giving comparative blood levels of the various sulpha compounds in common use in the different species. Practitioners should find this a most helpful guide in selecting the drug of choice in a particular animal. A small point which intrigues the reviewer is that sulphapyridine apparently never gives a therapeutic blood level in the cat, yet many small-animal practitioners still consider this to be one of the most effective sulpha drugs in the feline! Special consideration is given to certain diseases in which these drugs are of value.

The chapter on antibiotics now contains a much fuller account of penicillin, an antibiotic which was in its infancy at the time of publication of the previous edition. Streptomycin is also discussed, but it is stated that veterinary doses have not yet been established; this is disappointing in view of the relatively longer period during which this agent has been available to our American colleagues. Streptothricin, bacitracin, chloromycetin, clavicin and aureomycetin receive brief notice.

The section on vitamins has been re-written and considerably expanded to bring the material into line with modern knowledge. In this section folic acid and rutin are mentioned for the first time. Also in this chapter the amino acids and antihistamine drugs are newly discussed.

An extremely valuable addition to this book is the chapter by Dr. Alexander Zeissig on biologic diagnosis, prophylaxis and therapy. The complex subjects of antibody formation, principles of immunity, both natural and induced, are clearly explained and should make these matters readily comprehensible to student and practitioner alike. So many important sections are included in this chapter that no summary of its contents could do it justice. Part II of this chapter deals with the biological preparations used in the treatment of and immunisation against numerous diseases. Again, this section needs to be read for its value to be fairly assessed.

Devaluation has, of course, considerably increased the cost of this work to purchasers in this country, its price being doubled as compared with the previous edition. None the less, this book is a compendium of information drawn from a very wide field which cannot fail to be of considerable assistance to both students and practitioners. As befits a peace-time product, both binding and quality of paper are considerably improved.

QUESTIONS IN PARLIAMENT

Stud Farms

Mr. Nabarro (May 11th) asked the Minister of Agriculture in view of the importance of stud farms in the promotion of bloodstock exports, what steps he proposes to take, in conjunction with the Minister of Fuel and Power, to protect stud farms affected by opencast mining.

Mr. T. Williams: I cannot give an answer in general terms as so much depends upon the circumstances of the individual case.

Mr. Nabarro: Does the Minister really consider that bloodstock can be nourished and exercised on slag heaps?

Mr. Williams: The hon. Gentleman makes no reference in his Question to slag heaps.

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Food Production Council

Sir Ian Fraser (May 11th) asked the Minister of Agriculture what proposals he has with regard to the setting up of a permanent National Council for Domestic Food Production.

Mr. Hurd asked the Minister of Agriculture if he has decided to adopt the recommendations of the Committee on the Organisation of Domestic Food Producers; and what action he proposes to take to give continued protection to domestic poultry, rabbit and pig keepers in urban areas on the lines of the wartime Defence Regulation 62b.

Mr. T. Williams: I have accepted in principle the recommendations of the Committee on the Organisation of Domestic Food Producers, including that for the establishment of a National Council for Domestic Food Production, the terms of reference and membership of which will be announced in due course. Provision for the protection of domestic poultry and rabbit keepers on the lines recommended by the Committee is included in the Allotments Bill, which is being introduced to-day.

Sir Ian Fraser: When will a further announcement be made? Can we assume that any powers that are required will be included in the Allotments Bill?

Mr. Williams: I do not think any legislation is required, apart from what may be contained in the Allotments Bill.

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R.S.P.C.A. Establishment, Ningwood (Dairy Herd)

Lieut.-Colonel Lockwood (May 9th) asked the Minister of Agriculture why he insists upon a small dairy herd being kept at Ningwood Manor, Newport, Isle of Wight, in view of the fact that this establishment was left to the Royal Society for the Prevention of Cruelty to Animals on trust for the specific purpose of keeping old horses, and that the Society cannot adequately carry out the terms of that trust if he insists upon the establishment of a dairy herd on that property.

Mr. T. Williams: I am not insisting. While appreciating the humane purpose of the Society's establishment at Ningwood, and the limitations imposed by the terms of the trust, I have a duty to ensure that agricultural land is used productively. My Department has suggested to the Society that some form of agricultural production ought not to be inconsistent with the primary purpose of the establishment at Ningwood Manor, and, with the knowledge of the Charity Commissioners who are responsible for seeing that the trusts are kept, milk production was suggested. As a result of correspondence, however, my Department has very recently offered to send an officer of the Agricultural Land Service to meet a representative of the Society at Ningwood to discuss again what form of agricultural production could reasonably be undertaken.

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Humane Rabbit Trap

Mr. Amory (May 11th) asked the Minister of Agriculture whether there is yet available a satisfactory humane rabbit trap; and, if so, what steps are being taken to encourage its use.

Mr. T. Williams: So far as I am aware the Sawyer trap is the only trap designed on humane principles which is available in any quantity. The results of trials recently carried out with it by officers of my Department were not very satisfactory, and further trials with the trap and with a re-designed version of it are to be undertaken next month.

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Insecticides

General Sir George Jeffreys (May 11th) asked the Minister of Agriculture whether, before the new insectides based on the organic phosphorous compound, parathion, are used on a large scale in this country for hops, fruit and other crops, he proposes to take any special steps to ensure the avoidance of danger, both to users and consumers.

Mr. T. Williams: My Department is taking every opportunity to make known through the National Agricultural Advisory Service and the Press the dangers of these substances and how those dangers may be avoided. The manufacturers also provide instructions on the use of the insecticides and the precautions to be taken. If the available advice and instructions are followed with reasonable care I am advised that there should be no danger either to users or to consumers. I would add, however, that the compulsory provision of protective clothing for those using dangerous sprays was the subject of one of the recommendations of the Gowers Committee; and their Report, as my right hon. Friend the Minister of Labour said in reply to a Question by the hon. Member for Canterbury (Mr. Baker White) on April 20th, is now under consideration.

Sir G. Jeffreys: Is the Minister aware that in America a number of deaths have been attributed to the unskilled use of this particular insecticide, and is it to be understood from his statement that he has definitely ordered that special precautions shall be taken in its use?

Mr. Williams: We have given all the publicity we possibly can to the need for exercising great precaution to avoid any personal danger.

Mr. Gooch: In view of the fact that there have been several deaths in this country of people using these new insecticides, will my right hon. Friend consult with the Home Secretary with a view to completely abandoning their use?

Mr. Williams: The situation is being closely watched by the Agricultural Research Council, who are in close touch with the Medical Research Council, at the Ministry's Plant Pathological Laboratory. The protective procedure established and the conditions laid down are believed to be effectively and generally observed.

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West Indies (Soil Erosion)

Mr. P. Smithers (May 11th) asked the Secretary of State for the Colonies how far the Ngoli system of cultivation, as practised in Tanganyika, has been studied with a view to its trial in the West Indies on small holdings subject to erosion; and with what results.

Mr. J. Griffiths: I am making enquiries of the Governors concerned and will write to the hon. Member when I receive their replies.

MOVEMENT OF LIVE POULTRY

The Ministry of Agriculture and Fisheries announces that it is prepared to issue licences allowing the movement of live poultry into Scotland, Cumberland, Durham, Northumberland, Westmorland and the Furness District of Lancashire from recognised hatcheries and breeders' premises in any other part of Great Britain except the five special areas where restrictions on the marketing and movement of poultry are in force. Those five areas are London and its neighbouring districts, Birmingham and neighbourhood, South Wales around Cardiff and Swansea, South Lancashire including Liverpool and Manchester, and the City of Bristol. The licences must accompany the birds during their movement to the purchaser's premises.

Applications for licences are to be made to the Ministry of Agriculture and Fisheries, 28-32, Chester Terrace, Regent's Park, London, N.W.1, and must state the number and description of the birds to be moved, the name and address of the vendor, the address of the purchaser's premises and the proposed date of movement. The licences will be issued by a Veterinary Officer if he is satisfied that the movement could take place without risk of spreading fowl pest.

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Weekly Wisdom

If the World Health Organisation is given time and money to see its plans through to completion no nation will be able to afford to remain outside its membership, and we may hope that the U.S.S.R. will yet come to see that a global attack on disease and a world-wide health movement constitute a form of international activity that will allay suspicion and bring hope to millions.—"British Medical Journal" (May 6th: International Health Number).

NOTES AND NEWS

Diary of Events

May 24th.—Meetings of the Editorial Committee, N.V.M.A.: Executive, 1.30 p.m.; Main, 3 p.m.

May 24th.—Annual General Meeting of the Association of Veterinary Teachers and Research Workers (Scottish Regional Group) in the Hannah Dairy Research Institute, Kirkhill, Ayr, 2.30 p.m.

May 25th.—Special Meeting of the South-Eastern Division, N.V.M.A., at Maidstone (Royal Star Hotel), 6.30 p.m.

May 25th.—Meeting of the Herts and Beds Division, N.V.M.A., at Luton (The George Hotel), 7.30 p.m.

May 26th.—Meeting of the Royal Counties Division, N.V.M.A., at Reading (Caversham Bridge Hotel), 2.30 p.m.

May 27th.—Meeting of the Scottish Branch, N.V.M.A., at Stirling (Golden Lion Hotel), 2.15 p.m.

May 27th.—Annual General Meeting of the Society of Women Veterinary Surgeons, at the Royal Veterinary College, N.W.1, 1.30 p.m.

May 30th.—Meeting of the Welsh Branch, N.V.M.A., at Newtown (The Bear Hotel), 2 p.m.

May 31st.—Meeting of the Southern Counties Division, N.V.M.A., with demonstration, at centres near Salisbury. (See Notice.)

May 31st.—Annual General Meeting of the West of Scotland Division, N.V.M.A., in the University of Glasgow Veterinary School, 2.30 p.m.

June 2nd.—Meeting of the South Wales Division, N.V.M.A., at Tondu and Bridgend, 2 p.m.

June 7th.—**107th Annual General Meeting of the Royal College of Veterinary Surgeons, at the Royal College of Physicians of Ireland, in Dublin, 11.30 a.m.**

June 7th.—Annual General Meeting of Members of the Victoria Veterinary Benevolent Fund, at 10, Red Lion Square, London, W.C.1, 2.30 p.m.

June 8th.—R.A.V.C. Golfing Society, 1950. Meeting, at North Hants Golf Club, Fleet, commencing at 10 a.m.

June 9th.—R.A.V.C. Annual Dinner, Grosvenor House, London.

June 15th.—Joint Summer Meeting of the Sussex and South-Eastern Divisions, N.V.M.A., at the Wellcome Veterinary Research Station, Frant, 2.30 p.m.

July 12th and 13th.—Annual General Meeting of the Association of Veterinary Teachers and Research Workers (Northern Region), at Aberystwyth (Veterinary Department, Agricultural Building, Alexandra Road).

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R.C.V.S. Examinations

June 8th.—R.C.V.S. D.V.S.M. Written Examination commences, at Edinburgh.

June 22nd.—R.C.V.S. Membership Written Examination.

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Appointment of N.V.M.A. Liaison Secretary

We welcome the confirmation by Council, at its recent meeting in Edinburgh, of the appointment of Mr. Neil Hughes Mathieson, M.R.C.V.S., of Larkhall, Lanarkshire, as the Association's Liaison Secretary.

It will afford members satisfaction that from amongst the numerous applicants for the post it was found possible again to select a veterinary surgeon: Mr. Mathieson succeeds Mr. Geoffrey P. West, M.R.C.V.S., the first holder of the appointment, who after serving with signal success from August, 1947, early this year, to the great regret of the Association, left us to join the editorial staff of *Sport and Country*.

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Guide Dogs of the Blind

Following the recommendation made to Divisions of the Association that free treatment be given to guide dogs in the possession of blind people, the Organising Committee, at its recent meeting in Edinburgh, considered a suggestion that periodic inspections of such dogs should be carried out, if desired by the owner, also without charge, and recommend this to members of the Association.

It was pointed out that many conditions might develop in such dogs which might not be obvious to the owner, and that a routine inspection would allow of their early detection and treatment.

In view of the support forthcoming from members of the profession, through their Divisions of the N.V.M.A., for the beneficent work of the Guide Dogs for the Blind Association, they will be interested to learn that at a recent meeting to which Mr. W. B. Enever, Managing Director of "Chappie Limited," invited representatives of the Kennel Club, the Canine Defence League and others interested in the well-being of dogs, to meet Sir Victor Schuster, Chairman of the General Council of the Association, and Mr. Roger Eckersley, the Association's Appeals Organiser, a scheme was discussed whereby dog lovers will be able to help in the training of guide dogs for the blind.

At the outset there was described the intensive four months' training each dog receives, including three or four weeks on a course with its future master. Sir Victor Schuster then addressed the company, saying that the guide dog not only helped its blind master or mistress to get fresh air and exercise, it helped him to play his part in the running of the home and even to take up a trade or a career outside his hime. Through these dogs, the tragedy of blindness was transformed into a bearable physical disability: no more dependence on relations and friends for getting about—and the blind valued independence above everything.

The scheme has been suggested by Mr. Enever, who told representatives of other concerns, "There is a very long list of blind who need dogs, and I personally should like to see our industry doing its utmost to help train more animals." Already there is a list of over 300 blind men and women waiting for dogs but with present facilities only about 60 guide dogs can be trained each year at the Leamington kennels. This means a long wait for the late comers, so now a second training centre is being set up at Exeter in order that the waiting period may eventually be halved.

This in itself will involve considerable expense, and many of those at the meeting were surprised to learn that it costs £180 to train just one dog. This takes into account the feeding and care of the dogs (some three quarters of which fail to reach the high standards necessary to complete the course), the upkeep of the training centre, the trainers, kennel maids, administrative workers and offices. It is little enough compared with the price, say, of a car and beyond price in the independence it gives the blind owners, but nevertheless costly to an Association that has no Governement grant and which relies almost entirely on public support.

The plan, worked out with the approval of the Guide Dogs for the Blind Association, is that each packet of dog food or biscuits put out by the manufacturers taking part will be printed with a coupon-emblem common to all; if these are sent in to the Association by dog-owners, the manufacturer undertakes to honour each coupon in cash as a donation to the Association. Mr. Enever's company is ready to give its immediate support and other dog food and biscuit manufacturers are interested in co-operating in the scheme.

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We are glad to learn that the Guide Dogs of the Blind Association was selected by the Final Year Students of the Royal Veterinary College as the beneficiary of the proceeds of the pantomime "Ali Baba" which received admirable presentation at their hands on March 8th, 9th and 10th. The sum thus donated amounted to £25 18s.

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PERSONAL

Births.—Eden.—To Ruth Eden, M.R.C.V.S. (*née* Lawton), wife of Bryan Eden, of 99, Whiteknights Road, Reading, a son, Jonathan Gilbert.

Holford.—On May 9th, 1950, to Lorna Robertson, wife of Geoffrey Holford, 37, Roskear, Camborne, a son.

Kirkwood.—On May 11th, 1950, at St. Monan's Maternity Home, Reading, to Pat (*née* Brown), wife of Andrew K. Kirkwood, M.R.C.V.S., a daughter.

Walker.—On May 4th, 1950, to Nancy, wife of Cyril W. M. Walker, a son—Martin Ian.

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Marriages.—Harrison—Evans.—On March 23rd, 1950, at Caerleon, Mon., Val Ashley Harrison, M.R.C.V.S., to Eira R. Evans, S.R.N.

Hurst—Randle Hollingworth.—On April 27th, 1950, at Moat Street Methodist Church, Wigston, Peter E. Hurst, M.R.C.V.S., son of Mr. and Mrs. H. E. Hurst, The Maples, Wigston, Leicestershire, to Audrey, daughter of Mr. and Mrs. S. Randle Hollingworth, Newton Lane, Wigston, Leicestershire.

MUNRO—M'KENZIE.—At Rankin Church, Strathaven, on May 4th, 1950, by the Rev. R. M'L. Wilson, B.D., PH.D., and the Rev. T. M. Dey, B.D., Donald W. J. Munro, M.R.C.V.S., son of Mr. Donald Munro, M.A., F.E.I.S., and Mrs. Munro, 55, Townhead Street, Strathaven, to Margaret (Madge) Fleming M'Kenzie, daughter of Mr. and Mrs. T. M'Kenzie, 7, Church Street, Chapelton.

OLDHAM—ASTOIN.—On April 15th, 1950, at Ste. Geneviève's Church, Championnet, Paris, between John Godfrey Oldham, M.R.C.V.S., son of Mr. and Mrs. J. Oldham, Mill View, Tickow Lane, Shepshed, Leicestershire; and Mlle Monique Paule Astoin, daughter of M. and Mme Jacques Astoin, 150, Rue Ordener, Paris 18 eme, France.

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Liverpool University to Honour Professor Blakemore.—On July 7th Bristol University's first Professor of Veterinary Medicine, Professor F. Blakemore, is to have conferred upon him by Liverpool University the honorary degree of Doctor of Veterinary Science.

Professor Blakemore, who was superintending veterinary investigation officer for England and Wales, went to Bristol in 1948. He received his veterinary education at Liverpool and Manchester Universities.

After experience in practice, he served as Veterinary Investigation Officer for the Eastern provinces.

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Dr. Rohas Maldonado.—At the suggestion of the British Council, and following an invitation from the President, Dr. Rohas Maldonado, Professor of the Faculty of Veterinary Medicine and Zootechnics of the University of Colombia at Bogota, South America, called at 36, Gordon Square when the functions and interests of the N.V.M.A. were discussed. Dr. Rohas Maldonado is in this country for ten months visiting veterinary and agricultural institutions and a cordial invitation was extended to him to attend the N.V.M.A. Congress at Cardiff when it is hoped that members will have the pleasure of meeting our visitor.

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R.C.V.S. OBITUARY

The Late Mr. A. R. Green, M.R.C.V.S.

Mr. Alfred Ronald Green, whose death in Tanganyika at the age of 47 years we recorded with great regret in our issue of April 29th, was educated at Cheltenham College and Sandhurst. Retiring from the Regular Army in 1932, he entered the Royal Veterinary College, qualifying in 1937. After a period with the Ministry of Agriculture and later in private practice, on the outbreak of war Mr. Green returned to the Army. In 1943, after carrying out veterinary hospital duties at various centres in India he was posted to Lucknow, where he raised, mobilised and commanded an Advance Field Veterinary Hospital and proceeded with it on active service.

Postings as S.E.V.O. to Chittagong and Allahabad where his duties included the supervision of transport of meat on the hoof to troops in the field, and the veterinary administration of military farms, preceded command of a Veterinary Reception Hospital at Ballygunge, Calcutta, and of a Base Depôt Veterinary Stores supplying S.E.A.C.. At this time, very large numbers of cattle, pigs and goats were being imported on the hoof for feeding Eastern Command and S.E.A.C. troops, and all static units were being encouraged to breed these animals, with several large breeding establishments under Eastern Command.

In 1946, after release from Army Service, Mr. Green was appointed Deputy Director of Veterinary Services under the Government of Burma. Burma having lost over 75 per cent. of its cattle during the Japanese occupation, the immediate problems were restocking with suitable breeds, large scale anti-rinderpest inoculation, and control of foot-and-mouth disease. On the transfer of power in Burma and in consequence of the policy of the new Government in relation to the employment of European officers, this period of service came to an end, Mr. Green proceeding to Benghazi in April, 1949, and to Tanganyika later in the year.

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Stanley Howarth Whitworth

AN APPRECIATION

S. H. Whitworth was one of the most forthright and downright honest and honourable men I have ever met. He had the failings of men so endowed, being exceedingly shy and reticent.

It was while he was working abroad, and particularly in Malaya, during the years immediately preceding the second World War that on reading his annual reports as Chief Veterinary Officer one came to appreciate his capacity for gaining an insight that was genuine into practical problems of the greatest magnitude. In that respect, there have been very few men like him in my recollection in the veterinary realm who have combined the qualities forthcoming from a studious modern laboratory discipline with a keen sense of the real practical issues as perceived by a discerning field worker. I have dwelt elsewhere [*Brit. Vet. J.*, 1949, July, **150**, 7] upon the most valuable contribution made by Whitworth in adducing evidence from his Malayan experience pointing inexorably to the fallacy of attempting to set up an active immunity on a field scale among cattle by inoculation with an inactivated vaccine.

There was much else of this kind in Whitworth's work that could be noticed and that causes one now to lament his death.

During visits to him before his death it had been my hope that with change in environment and occupation he would pull through, for he was, indeed, when his environment was congenial to him, a happy soul, whose company was sought and relished by all who hold in high respect his particular type of personality.

J. T. E.

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R.C.V.S. ANIMAL MANAGEMENT EXAMINATION

LIST OF SUCCESSFUL CANDIDATES

DUBLIN:

Byrne, J. G.
Chapman, W. R.
Deeney, E. E.
Dowling, J. P.
Driscoll, Cornelius
Flanagan, Wm.
Gallery, G. J.
Gilchrist, E. W. (Credit)
Hatch, Charles (Credit)
Hernon, P. C.
Johnson, R. E.
Kelly, E. J.
Kelly, J.
Linton, J. A. M.
McAuley, Bernard (Credit)
McCarthy, James
McGrath, M. J.
Magee, B. F.
Marsh, J. H.
Mooney, F. M.
Noonan, J. D.
O'Keeffe, D. J. (Credit)
Quirke, J. M.
Toolan, G. A.
Tubridy, T. J.
Walsh, P. D.

GLASGOW:

Bickerton, D. T.
Borland, H. A.
Bradley, J. A. R.
Calder, H. A. M.
Cocozza, G.
Crawford, T. G.
Cruikshank, George
Cullen, R. G.
Ferguson, Allen
Gibb, J. A.
Gilmour, M. J.
Hutchison, James
Johnson, W. S. (Credit)
Kerrin, F. E.
King, K. M.
Lyon, Miss B. E. (Credit)
Mackenzie, Alexander
Mackintosh, T. M. S.
Martin, Miss Heather
Reilly, Daniel
Seawright, David
Slater, Duthie
Spy, G. M.
Taylor, J. W.
Thom, Alasdair
Towers, Miss I. S.
Tudhope, K. M.
Wallace, D. McL.
Watson, J. M.
West, R. C. A.

EDINBURGH:

Adamson, J. D.
Affleck, Harry
Baird, A. C.
Baird, R. G.
Barker, A. M.
Blizzard, S. V. A.
Bowie, J. T.
Campbell, R. J.
Cartwright, C. F.
Cheminant, D. A. Le (Credit)
Couttie, M. A.
Crocker, R. W.
Curran, G. D.
Dakin, G. W. (Credit)
Eddy, Cecil
Fuller, A. T. (Credit)
Garratt, T. R.
Gourlay, R. N.
Hamilton, W. W.
Harrington, J. L.
Harrison, A. F.
Hutton, P. H.
Lyon, Miss E. C. M.
Mackie, W. L.
McKinlay, D. I.
MacLaren, A. P. B.
MacLeod, Peter
Nelson, J. P.
Norman, T. H. (Credit)
Proverbs, R. S.
Roberts, A. W.
Scales, Philip
Vasey, H. F. (Credit)
Wells, Miss A. J. (Credit)
Stewart, D. L. (Credit)

(To be concluded)

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"A HEALTHY DAIRY HERD"

VETERINARY CONTRIBUTORS TO DISCUSSION AT GUILDFORD

Five leading veterinarians (reports the *Surrey-Sussex Farmer*, in its May issue) took part in a discussion, entitled "A Healthy Dairy Herd," arranged by the Guildford Cattle Breeding Centre and held at the County Technical College in April. Mr. J. W. Bruford, President of the National Veterinary Medical Association, was in the chair, and introduced the other speakers, all of them experts in their particular field.

Mr. J. N. Ritchie, Deputy Chief Veterinary Officer of the Ministry, speaking on tuberculosis, said the cost of this disease had been

estimated at £10,000,000 annually. It most commonly infected the lungs, but when it affected the udder, the public health aspect became vitally important. Referring to the tuberculin test, Mr. Ritchie stated that Johne's disease and skin tuberculosis also sensitised the animal to the test, but the comparative test distinguished bovine tuberculosis: "Although far from 100 per cent. accurate, it is quite reliable," he said. Cleanliness in the buildings and isolation of the reactors were important factors in establishing a free herd.

Dr. A. W. Stableforth, Director of the Ministry's Veterinary Laboratory at Weybridge, spoke on mastitis, and said that thanks to research and capable veterinarians, this disease was no longer a serious problem. Ninety per cent. of infections were cured by penicillin treatment, but there was a form in which individual cows did not appear to be permanently affected, but in which infection "moved round the herd." It was thought that this form of the disease responded to proper management methods. In cases of the acute summer mastitis, which was uncommon in Surrey, there was no known treatment.

The problem of contagious abortion was dealt with by Mr. J. R. Lawson, Senior Research Officer at Weybridge. This was characterised by abortion, usually between the sixth and eighth month of pregnancy. Trichomonas (venereal) disease in cattle generally caused much earlier abortion. As there was no cure for contagious abortion, control must aim at prevention, either by testing and elimination of reactors, or by vaccination. He favoured the latter method, which he thought to be about 98 per cent. effective. He advised vaccinating the young animal: it was unwise to vaccinate an in-calf animal, since the vaccination caused a severe rise in temperature which was itself sufficient to cause abortion.

The final speaker was Professor F. Blakemore, Director of Veterinary Studies at Bristol University, who spoke on the rearing of healthy calves, the "foundation for a decent herd." Most deaths of calves, said Professor Blakemore, were caused by some form of white scour, which in turn was usually caused by *Bacillus coli*—"A very ordinary and common germ which a healthy animal should be able to repel." The most important factor in giving calves resistance to common diseases was the colostrum provided by the dam which contained antibodies which the cow concentrated in the colostrum against diseases which she had encountered. She did this fairly early in her dry period.

The conference was summed up by Mr. Bruford, and the vote of thanks was proposed by Professor Dalling.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

PANTING IN CATTLE

Sir,—In a letter published in *The Veterinary Record* of May 6th, 1950, Col. C. M. Stewart has commented on the work done on panting in cattle at the Indian Veterinary Research Institute at Izatnagar. If I may begin by expressing a personal view, I would say that it was due to Col. Stewart's interest that in its broader aspect the importance of this matter in the military economy of India was emphasised. It appears, however, from his present remarks that he has not read all the papers on the subject contributed by myself and a colleague. These are as follows:

[1] *J. Amer. vet. med. Assoc.* 1948. **113.** 545.
[2] *Amer. J. vet. Res.* 1949. **10.** 40.
[3] *Ibid.* **10.** 49.

Nos. 1 and 2 deal with clinical and pathological aspects, while No. 3, by Dr. D. N. Mullick, contains biochemical observations. No. 1 was reprinted in a recent issue of the *Indian Veterinary Journal*. The title of the three articles is "Panting in cattle. A sequel to foot-and-mouth disease."

Col. Stewart's comments refer to a short abstract in *The Veterinary Record* of April 15th, for which I was not responsible, and to an "earlier article"—presumably No. 1—but no references are given. He denies that panting is caused by foot-and-mouth disease, but asserts that it is simply a bodily disturbance due to high air temperature and humidity in high-producing cows with European blood. He has, moreover, formed the impression that my observations were confined to a few animals and that "I may not have had the advantage of access to the large number of animals in Military Dairy Farms." At the outset it is quite obvious that Col. Stewart's criticisms are based upon a misunderstanding, partly, I suggest, because he has not been in a position to read all that has been written on the subject by ourselves and others. In order to bring out the source of this misunderstanding it is necessary to mention a few facts by way of background.

Cattle, like some other animals and man, vary in their resistance to heat and other agencies. Confining attention to cattle, it is well known, of course, that European cattle in general are not genetically fitted for hot climates and that in order to keep their bodies cool they have to increase the rate of breathing and to some extent to alter its character. The strain is greater when the animals are in production. It is perhaps less well known that there are variations in this respect even among European breeds of cattle. Variations also exist which are connected with the individual animal and not with its breed, age, sex or productive state, so, as might be anticipated and without going into details, the matter is not quite uncomplicated. Rhoad (*Empire J. Exp. Agric.* 1940. **8.** 190) in Louisiana has done much to bring the selection of animals suitable for hot climates on to a scientific basis by introducing certain fitness tests, based on measurements of respiration rates, body temperatures and on other methods. These tests would distinguish animals belonging to any of the categories mentioned above. Animals whose heat tolerance failed to come up to a certain standard could be put down as physiologically unadapted for breeding or life in a hot climate. Incidentally, there is a vast field in India and Pakistan for trials on the lines laid down by Rhoad, owing to the great diversity of climate and the numerous breeds of cattle and other domesticated animals in the subcontinent. Dr. Rhoad was not primarily interested in panting as a disease, but in breeding new strains of cattle whose constitution would be suited for highly productive life in hot climates. The same is probably true of Dr. R. B. Kelley, to whom Col. Stewart wishes to refer and with whom I have had the benefit of personal discussion. Dr. Kelley has long advocated the introduction of Zebu cattle into Australia for cross-breeding and indeed some have already been used in Queensland.

Now Col. Stewart, it seems, would include in the category of panters in short all those cattle which would fail to pass the tests devised by Rhoad. With the Military Farms animals this would mean rejecting a large proportion of the stock, and this, I submit, would be casting the net far too wide. If applied to man, for instance, it might mean that no European could enter tropical service, owing to the risk that if he played cricket vigorously enough to make him pant he might be at once rejected as unfit for further service on medical grounds. On the other hand, the term "panting," as used by us and *in accordance with the title of our articles*, has a much more restricted meaning. In correspondence and discussion in India, it has not been suggested that anything more than this was intended. The symptoms of this affliction are a dyspnoeic or panting respiration and an elevated body temperature in the heat, a long rough coat, unthrifty condition and a strong tendency to seek shade or even to sit in water. In really bad cases the animals are obviously in distress. Mullick found deviations in certain blood and urine values, such as those of haemoglobin, lactic acid, alkali reserve. Pathologically, the outstanding lesion was a thyroid reduced in size, but considered to be relatively overactive. The symptoms were clearly related to a permanent defect somewhere in the heat-regulatory mechanism. The condition is so well recognised in India that various local names have been applied to it, but the use of a more appropriate designation than "panting" should perhaps be deferred until more is known about the pathology of the condition.

Discussion on a relationship between the condition and foot-and-mouth disease would unduly lengthen this letter. I would however point out, (a) that undoubtedly the same condition has been recognised as a sequel to foot-and-mouth disease in some temperate countries like Belgium and Switzerland, (b) that from authoritative statements it does not occur in the U.S.A. and Australia, countries that are free from foot-and-mouth disease.

Col. Stewart is surprised that I found panters among the Zebu cattle of India. The observation is not wholly mine, but that of certain Military Farm managers who responded to a comprehensive questionnaire kindly issued on my behalf by Brigadier Soutar, then D.V.S. in India. Actually it so happens that I have notes of three Sahiwal cows regarded as panters belonging to the Ferozepore Farm, mentioned by Col. Stewart. In conclusion, I must say that I have been afforded every facility and advice on the many Military Farms I have visited.

Yours faithfully,

c/o Messrs. Glyn Mills & Co., F. C. MINETT.
Whitehall, S.W.1.

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ATTESTATION: IS IT A GOOD POLICY?

Sir,—My experience has been that once a herd has reached this designation the incidence of disease has decreased, and the milk yield increased. On this evidence I am of the opinion that the reply to the above query must be in the affirmative. The apparent inconsistencies in the result of the tuberculin test could, I consider, be reduced appreciably if its interpretation was left to the

one who conducted it, who should, in addition, take into account the health of the herd, before coming to a final decision.

Whilst the Accredited Herd system has encouraged dairy farmers to pay more attention to clean and increased milk production, from the standpoint of disease eradication it has proved futile, and its continuation would be prejudicial to the establishment of disease-free herds. Very fortunately, unless revoked, new regulations will bring it to an end in 1945.

In conclusion, may I express the hope that in the very near future, hospital farms, at present supervised by the Ministry of Health, on which appreciable quantities of milk are produced for consumption by the patients, shall be subject to the same statutory control of the Ministry of Agriculture and Fisheries, which is applicable to normal milk producers.

Yours faithfully,

"Rothiemurchus," St. Cross, Winchester. J. F. D. Tutt, F.R.C.V.S.

May 6th, 1950.

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FERTILITY IN CATTLE: EFFECT OF *POST-PARTUM* INTERVAL

Sir,—The conception rate in dairy cattle is of great economic importance. The breeder wishes his cows to conceive regularly to keep up his milk supply and the finances of artificial insemination centres (which are used by more than 65,000 farmers) are affected by the fertility level because the cow which does not conceive to the first insemination is entitled to receive up to two "repeat" inseminations free of charge.

The facts which follow demonstrate that the length of the interval between parturition and the date of first service has an effect on the conception rate. Service records for 11,685 cows mated at varying intervals after calving have been analysed. (These records have been supplied by breeders using natural mating.)

Days interval between parturition and first mating	*No. of cows*	*Conception rate to first mating**
0— 30 days	290	48·3 per cent.
— 60 „	2,012	62·5 „ „
— 90 „	4,431	73·1 „ „
—120 „	3,068	71·5 „ „
—150 „	1,265	73·4 „ „
—180 „	619	69·7 „ „

*Cows out of 100 assumed to be in-calf if they have not returned to service after three months.

Statistical analysis (kindly made by Mr. R. C. Campbell, of the Statistical Laboratory, University of Cambridge) shows that the increase in conception rate over the first three periods is very significant. The apparent tendency of the c.r. to drop in the last period is not significant on the facts available, nor is the c.r. for service in a given period after calving affected significantly by the month of service.

The result has considerable fundamental and practical importance. As to the latter, it may explain results which have been thought to show a strictly "seasonal" effect but which may in fact be due to practice. For example, the producer of winter milk tries to get his cows to calve in October/November and by mating them in December/January to repeat this annually. However, conceptions for part of the herd invariably become delayed and an attempt to regain time may be made by mating cows that calve in January/February as soon as possible after parturition. The analysis made here shows that such a practice is likely to result in reduced fertility for a temporary period.

Yours faithfully,

Joseph Edwards.
Production Division,
Milk Marketing Board,
Thames Ditton.

May 12th, 1950.

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ANASTOMOSIS OF THE INTESTINE IN THE DOG

Sir,—I read with interest the article by Mr. Hickman on methods of anastomosis of the intestine in the dog, as I have recently performed a double enterectomy using the end-to-end method. In the case in question it was necessary to remove two pieces of small intestine, one 6 inches, one 4 inches long. I had no great difficulty in suturing the ends by joining mucosa first with a continuous suture, and then joining the muscle layers with closely placed interrupted sutures. I make a point of covering the whole area with omentum sutured securely into position over the join, and I believe that this helps greatly in preventing small leakages and adhesions. I did not suture the mesentery.

The case in question was given fluids (water and tea) by mouth from the first day. No saline injections were needed, there being no appreciable shock. Soft foods were given on the fourth day after operation, and the abdominal stitches removed on the sixth day, when a minced meat meal was taken with no ill effects.

Yours faithfully,

85, West Street, Ryde, I.W. Pamela M. Reynolds.

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NEW ZEALAND VETERINARY CLUB PRACTICE APPOINTMENTS

Sir,—I have been instructed by my Council to ask you to publish the following.

Recent copies of *The Veterinary Record* have carried advertisements for vacancies in the Veterinary Club Movement in New Zealand under the auspices of the Veterinary Services Council. These vacancies may appear very tempting for those who have been busily engaged in private practice for some years. A number of British graduates have accepted such positions and found the position much to their liking.

However, there are a number of problems yet to be sorted out. These in some instances are of sufficient gravity for the men who have arrived from Great Britain to return to their country as soon as their two years have expired, whilst others have expressed considerable dissatisfaction although they have maintained employment. This Association is working in close co-operation with the Veterinary Services Council in an endeavour to find a solution to these problems. In the meantime, however, it is apparent that a number of immigrants have arrived from Great Britain with somewhat erroneous ideas as to the type of work they are to do.

May I suggest that any such graduates intending to accept Club employment should write to this Association first in order to find out the state of affairs at present existing so that they do not feel that they have arrived in this distant land under false impression.

Yours faithfully,

c/o Zoological Park, Grey Lynn, Auckland. R. W. Roach, *Hon. Secretary*. New Zealand Veterinary Association.

March 3rd, 1950.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange*	Sheep Scab	Swine Fever
April 16th to 30th 1950	17	—	9	—	—	1
Corresponding period in— 1949	16	—	22	—	1	1
1948	5	—	6	—	2	2
1947	7	—	77	—	3	—
Jan. 1st to April 30th, 1950	155	12	69	—	19	2
Corresponding period in— 1949	64	11	162	—	27	5
1948	40	—	161	1	23	13
1947	27	83	138	1	18	14

Note.—The figures for the current year are approximate only

* Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at April 30th, 1950, was as follows:—

England	Wales	Scotland	Total (Great Britain)
20,881	14,314	12,624	47,819